AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended) A method of etching silicon anisotropically, comprising:

etching~~in which~~ a silicon substrate ~~(2)~~, protected in part by a mask, ~~(2c) is subjected to an alternating succession of attack steps (a)~~ using a plasma of etching gas to make cavities ~~(2b)~~ in zones of the substrate that are not protected by the mask ~~(2c)~~, ~~and~~

depositing a protective polymer~~passivation steps (b) using a plasma of passivation gas for depositing protective polymer (2f)~~ on the walls of the cavities ~~(2b) that result from the attack steps~~ using a plasma of passivation gas, and

subjecting ~~the method being characterized in that it further comprises selective depassivation pulse steps (c) in which~~ the protective polymer deposit to ~~(2f) is subjected to the action of~~ a plasma of cleaning gas that removes the protective polymer ~~(2f)~~ from ~~the~~ bottom zones ~~(2g)~~ of the cavities ~~(2b) and that~~, wherein the plasma of cleaning gas is more effective than the etching gas at removal of the protective polymer.

2. (currently amended) ~~A~~ The method according to claim 1, ~~characterized in that it includes a selective depassivation pulse step (c) after each passivation step (b).~~ wherein the plasma of cleaning gas is applied after each deposit of the protective polymer.

3. (currently amended) ~~A~~ The method according to claim 2, ~~characterized in that each selective depassivation pulse step (c)~~ wherein the application of the plasma of cleaning gas does not overlap the preceding ~~passivation step (b),~~deposit of the protective polymer and does not overlap ~~the~~ a following ~~attack step (d).~~etching of the silicon substrate.

4. (currently amended) ~~A~~ The method according to claim 1, ~~characterized in that~~wherein the etching gas is a fluorine gas such as SF_6, CF_4, or NF_3.

5. (currently amended) ~~A~~ The method according to claim 1, ~~characterized in that~~wherein the passivation gas is a fluorocarbon gas such as CHF_3, C_2F_6, C_2F_4, or C_4F_8.

6. (currently amended) ~~A~~ The method according to claim 1, ~~characterized in that~~wherein the cleaning gas contains oxygen.

7. (currently amended) ~~A~~ The method according to claim 6, ~~characterized in that~~wherein the cleaning gas comprises at least one of the following gases: O_2, SO_2, CO, CO_2, NO, NO_2, and N_2O.

8. (currently amended) ~~A~~ The method according to claim 1, ~~characterized in that~~wherein during the ~~selective depassivation pulse step (c),~~application of the plasma of cleaning gas, the silicon substrate ~~(2)~~ is biased so as to ~~attack~~ attract the ions of the plasma of cleaning gas.

9. (currently amended) ~~A~~ The method according to claim 8, ~~characterized in that~~wherein the silicon substrate ~~(2)~~ is biased by a voltage close to ~~the~~ a voltage used during the ~~attack step (a)~~etching of the silicon substrate, typically in ~~the~~ a range 20 V to 100 V, ~~advantageously~~ and preferably in ~~the~~ a range 20 V to 80 V.

10. (currently amended) ~~A~~ The method according to claim 8, ~~characterized in that~~wherein the bias voltage applied to the silicon substrate ~~(2)~~ is increased progressively from one ~~depassivation step~~application of the plasma of cleaning gas to another application of the plasma of cleaning gas, during the process of etching ~~a~~ the silicon substrate ~~(2)~~.

11. (currently amended) ~~A~~ The method according to claim 8, ~~characterized in that~~wherein during the ~~selective depassivation pulse step (c);~~application of the plasma of cleaning gas, ~~the~~ a pressure of the atmosphere ~~(5)~~ surrounding the silicon substrate ~~(2)~~ lies in ~~the~~ a range 0.5 Pa to 10 Pa, and preferably in ~~the~~ a range 2 Pa to 5 Pa.

12. (currently amended) ~~A~~ The method according to claim 1, ~~characterized in that~~wherein ~~the~~ a duration of the ~~selected depassivation steps (c)~~application of the plasma of cleaning gas is selected ~~to be just sufficient~~ to ensure effective cleaning of the bottom zones ~~(2g)~~ of the cavities ~~(2b)~~.

13. (currently amended) ~~A~~ The method according to claim 1, ~~characterized in that~~wherein ~~the~~ a duration of the ~~selected depassivation pulse step (c)~~application of the plasma of cleaning gas is determined as a function of ~~the~~ a duration of the preceding ~~passivation steps (b).~~deposit of the protective polymer.

14. (currently amended) ~~A~~ The method according to claim 1, ~~characterized in that~~wherein ~~the~~ a duration of the ~~selected depassivation pulse step (c)~~application of the plasma of cleaning gas increases from one ~~depassivation step~~application to another during the process of etching ~~a~~ the silicon substrate ~~(2)~~.

15. (currently amended) ~~Apparatus~~ An apparatus for anisotropically etching silicon substrates ~~(2), by implementing a method according to claim 1~~, the apparatus comprising:

a gastight enclosure ~~(1)~~ shaped to receive and contain a substrate ~~(2)~~ for etching;

means ~~(6, 7)~~ for creating and maintaining a suitable vacuum in the enclosure ~~(1)~~;

gas injection means ~~(13)~~ for selectively injecting into the enclosure ~~(1)~~an etching gas, a passivation gas, and a cleaning gas for programmed durations and at programmed flow rates;

means ~~(8)~~ for generating a plasma ~~(9)~~ in the enclosure ~~(1)~~ facing ~~the~~ a surface ~~(2a)~~ of the substrate ~~(2)~~ that is to be etched;

means ~~(4)~~ for biasing the substrate ~~(2)~~; and

control means ~~(22)~~ for controlling the gas injection means ~~(13)~~ to perform the successive application of etching gas, passivation gas, and ~~depassivation~~cleaning ~~steps~~gas.

16. (currently amended) A silicon-based component having a micro-relief ~~(2b) presenting~~ with an aspect ratio greater than 30, the silicon-based component made using a method according to claim 1.